



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/728,193	11/30/2000	Etsuo Morita	09792909-4714	4426

26263 7590 05/31/2006

SONNENSCHN NATH & ROSENTHAL LLP
P.O. BOX 061080
WACKER DRIVE STATION, SEARS TOWER
CHICAGO, IL 60606-1080

EXAMINER

SONG, MATTHEW J

ART UNIT	PAPER NUMBER
----------	--------------

1722

DATE MAILED: 05/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/728,193

Applicant(s)

MORITA, ETSUO

Examiner

Matthew J. Song

Art Unit

1722

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-6,8-20,23-25,27 and 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-6,8-20,23-25,27 and 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see page 11-12 filed 3/16/2006, with respect to the rejection(s) of claim(s) 1-2, 4-6, 8-20 and 23-25 under 35 U.S.C 103 rejections in view of Natsume (US 5,672,520) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the combination of Tsuda et al (US 6,294,440) and Tada (US 5,418,799).
2. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-2, 4-6, 8-20, 23-25, and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuda et al (US 6,194,440) in view of Tada (US 5,418,799).

Tsuda et al teaches a GaN layer 101 is grown to a thickness of about 4 micrometers on a sapphire substrate 100 (claim 14) is placed in a growth chamber and a first patterned mask made of SiO₂ (claim 12-13) is formed on the GaN layer 101 by sputtering (claim 15) and the SiO₂ film

Art Unit: 1722

is patterned to a periodic strip with a width of about 7 micrometers and a pitch of about 10 micrometers by conventional photolithography method, whereby a first SiO₂ mask **102** is formed (col 7, ln 20-45). Tsuda et al also teaches a GaN crystal film **103** is grown by Metal organic vapor phase epitaxy (MOVPE) to a thickness of about 3 micrometers and a forming a second mask on the GaN film **103**. Tsuda et al also teaches the second mask film **104** is a SiO₂ film with a thickness of about 200 nm with a periodic strip pattern (claim 2 and 7) with a width of about 8 micrometers and a pitch of about 10 micrometers is formed by a photolithography method and forming a GaN single crystal film **105** thereon by MOVPE (col 7, ln 46-67 and col 8, ln 1-30 and Fig 1). Tsuda et al also teaches it is important to select a relationship between the size of each opening of the first mask and the stripe width of the second mask, depending upon required characteristics of a light-emitting device (col 8, ln 31-65). Tsuda et al also teaches a semiconductor substrate including a sapphire substrate can also be used as a substrate, where a sapphire substrate may be peeled off from a semiconductor structure by grinding or etching and the remaining structure can be used as a substrate (claims 20 and 24) (col 22, ln 2-60). The gallium nitride of layers **103** or **105**, which lies between the dielectric patterns of **102** and **104** clearly suggests applicant's first III-V nitride pattern having a first pitch. Tsuda et al also teaches forming a semiconductor laser device which includes Gallium nitride based semiconductor layers **106**, **107**, **108**, **109**, **111**, **122**, and **113**, which partially overlaps and partially does not overlap the gallium nitride of layers **103** and **105**, which lies between the SiO₂ strip pattern. (Fig 6 and col 11, ln 30-67). Tsuda et al also teaches forming an electrode **115** (col 11, ln 30-67).

Hayashi et al teaches a method of forming a second III-V nitride pattern having a pitch different from the first pattern and wherein the second pattern partly overlies and partly does not

Art Unit: 1722

overlie the first pattern in the direction of the thickness of the crystal due to at least in part to the different pitches of the first pattern and the second pattern.

In a method of forming a laser element, note entire reference, Tada teaches a semiconductor laser device substrate includes a plurality of semiconductor laser device elements arranged in an array (Abstract). Tada also teaches element separating guiding grooves between the semiconductor laser devices (Abstract and Fig 1). Tada also teaches each device is 300 μm in width (Fig 2e and col 4, ln 40-65).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Hayashi et al by forming a plurality of semiconductor laser devices in a pattern, as taught by Tada to increase productivity by producing a plurality of devices on a single wafer.

The pattern of the III-V laser device layer 107 between adjacent laser devices ('440 Fig 6 and '799 Fig 1) and the pitch of the gallium nitride 103 between the SiO_2 strips 102 is clearly different, which is expected to cause the second pattern to partly overlap and partly not overlap the first pattern.

Referring to claim 2, the width of layer 106 of the first pattern and the width of the GaN between the SiO_2 stripe 102 is clearly different ('440 Fig 1).

Referring to claim 4, the combination of Tsuda et al and Tada teaches a pitch of 10 μm and laser elements are 300 μm in width; therefore the approximate relationship is within the claimed range $(300 \times 10 / (300 - 10) = 10.34)$.

Art Unit: 1722

Referring to claims 5-6, the combination of Tsuda and Tada teaches the grooves and laser devices are arranged in a plurality of different positions ('799 Fig 1), this clearly suggests pattern elements with different pitches.

Referring to claim 8, the combination of Tsuda and Tada teaches laser devices arranged in the lateral direction and longitudinal direction.

Referring to claim 9-10, the combination of Tsuda and Tada teaches stripes. The combination of Tsuda and Tada does not teach a rhombus, parallelogram, hexagon or triangular shape. Changes in shapes are held to be obvious, absent evidence of unexpected results; therefore it would have been obvious to one of ordinary skill in the art to use a rhombus, parallelogram, hexagon or triangular shape pattern.

Referring to claims 11-15, the combination of Tsuda and Tada teaches a first growth step of forming GaN directly on the sapphire substrate and on the SiO₂ mask.

Referring to claim 16-19, the combination of Tsuda and Tada teaches etching and masking. Etching through the dielectric layer is expected to etch a portion of the base layer because etch end point detection and selectivity is not perfect; therefore a nominal portion of the underlying material will be etched.

Referring to claim 20, the combination of Tsuda and Tada teaches removing the substrate ('440 col 22, ln 10-55).

Referring to claim 23-26, the combination of Tsuda and Tada teaches forming a device comprising a cladding layer, a protrusion, a contact layer and an electrode ('440 Fig 6 and col 12, ln 1 to col 13, ln 65).

Referring to claim 27-28, the combination of Tsuda and Tada teaches III-V nitride patterns.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

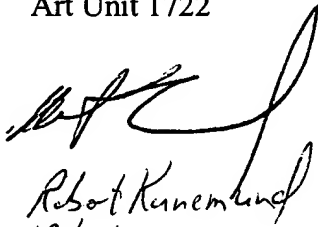
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1722

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song
Examiner
Art Unit 1722

MJS
5/30/2006



Robert Kunemund
Patent Examiner
TC 1722